Case Report

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Development of communication using the DHACA® method in dizygotic twins with autism

Desenvolvimento da comunicação com uso do método DHACA® em gêmeos dizigóticos com autismo

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ABSTRACT

This study aims to analyze the development of communication in dizygotic twins with autism following intervention with the DHACA® method (Development of Communication Skills in Autism). It is a longitudinal case study with a qualitative and quantitative approach conducted with a pair of dizygotic twins (GM and GF), aged 3 years and minimally verbal, using the Childhood Autism Rating Scale (CARS) and the ACOTEA protocol (Communication Assessment in Autism Spectrum Disorder) over 3 sessions, and subjected to 20 intervention sessions with the method. The evaluation results demonstrate an increase in scores on the instruments, indicating greater development of expressive, comprehension, and social interaction skills, evidenced in receptive communication in GF and social behavior in GM, with a 33.33% improvement in the ACOTEA. The twins' vocabulary also increased, with the acquisition of new lexical categories using DHACA®. The use of a robust communication system contributed to the development of communication skills in twins with ASD.

Keywords: Autism spectrum disorder; Twings; Communication; Speech, language and hearing sciences; Language; Assistive technology

RESUMO

Este estudo teve por objetivo analisar o desenvolvimento da comunicação em gêmeos dizigóticos com autismo, após intervenção com o método Desenvolvimento das Habilidades de Comunicação no Autismo (DHACA®). Trata-se de um estudo de caso longitudinal, de caráter qualitativo e quantitativo, realizado com um casal de gêmeos dizigóticos (GM, gemelar do gênero masculino e GF, gemelar do gênero feminino), com 3 anos de idade e minimamente verbais, avaliados por meio da escala Childhood Autism Rating Scale e do protocolo Avaliação da Comunicação no Transtorno do Espectro Autista (ACOTEA), durante três sessões, e submetidos a 20 sessões de intervenção com o método. Os resultados da avaliação demonstraram aumento nos escores dos instrumentos utilizados, ou seja, maior desenvolvimento das habilidades de expressão, compreensão e interação social, evidenciado nos aspectos da comunicação receptiva em GF e de comportamento social em GM, com melhora de 33,33% no protocolo ACOTEA. Além disso, observou-se aumento do vocabulário dos gemelares, com aquisição de novas categorias lexicais utilizando o DHACA®. O uso de um sistema robusto de comunicação contribuiu para o desenvolvimento das habilidades comunicativas nos gêmeos com transtorno do espectro autista.

Palavras-chave: Transtorno do espectro autista; Gêmeos; Comunicação; Fonoaudiologia; Linguagem; Tecnologia assistiva

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INTRODUCTION

The most recent edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR) lists the following diagnostic criteria for autism spectrum disorder (ASD): persistent deficits in reciprocal communication and social interaction across a variety of contexts, and restricted and repetitive patterns of behavior, interests, and activities (occurring in speech, movements, or handling of objects in a stereotyped manner or excessive fixation on routines and ritualized patterns). These symptoms are present since early childhood, resulting in clinically significant impairment in personal, social, academic, and occupational development[1].

ASD is among the neurodevelopmental disorders with the strongest evidence of a genetic basis for its manifestation. The proportion of heritability or phenotypic variation due to genetic reasons is estimated at approximately 90% of cases, with a significantly higher prevalence in monozygotic twins than in dizygotic twins[2]. Sex can also influence the expression of the autism gene, given that concordance for male-female or female-female dizygotic twins is 20% and for male-male dizygotic twins is 40%[3].

Studies indicate that the twin condition may be related to delays in language acquisition, when compared to language development in only children[4]. Moreover, authors argue that being a twin reduces the need for interaction with different people in the environment, given that the twin pair could fulfill the role of communicative partner. Thus, the stimuli for language development would be naturally reduced[5].

Since difficulty in social interaction is one of the main characteristics of autism, it is possible to infer that children do not build a shared communicative understanding when both have ASD, further affecting language acquisition.

Augmentative and alternative communication (AAC) systems are among the main intervention approaches used to promote functional communication in these individuals, aiming to contribute to the development of communicative skills in people with autism.

This study used the Development of Communication Skills in Autism (DHACA®) method, which aims to develop functional communication using a robust alternative communication system. It is based on the theory of language acquisition by use, or sociopragmatic theory, which describes that humans acquire their language[6] through linguistic activity during interaction with others. Children initially imitate and later construct their linguistic expressions according to the most frequent utterance constructions within a context that is meaningful to them[7].

Thus, the DHACA® method values participation in social-communicative activities with others, the role of the communication partner, the use in diverse and natural contexts, and the stages of typical linguistic development. It particularly highlights family engagement, since it is family members who promote the consistent use of AAC in all environments, playing an important role in the therapeutic process and in the child's social and communicative development, directly influenced by the experiences lived by this core group[8].

The intervention is playful, personalized according to the child's interests and needs, taking into account the various contexts in which they are involved. During the intervention process, the use of the DHACA® communication book facilitates understanding and learning, acting as a visual support, and improving receptive language. The user's constant visual exposure to essential and accessory vocabulary, in addition to structured visual activities, facilitates the intervention process. All sessions in this study used activities that promoted shared attention with the object or activity of specific interest to the child, favoring natural engagement[6].

The strategies include cues, which are essential in the process of acquiring and developing communication skills in the DHACA® method. The method uses physical cues (total and partial), visual cues, and verbal cues. They function as support offered by the speech-language-hearing (SLH) pathologist, family members, and other communication partners to foster the learning of new skills, being used hierarchically: it starts with greater support and, gradually, the assistance is reduced, until it is completely withdrawn, as the person with ASD progresses[9].

Aiming at the functional use of language, the method uses the robust linguistic system based on core words, a selection of words that are highly frequent in discourse and that enable the use of various communicative functions. It also uses the modeling strategy, providing a model of AAC use for the child to learn how to use the same linguistic signifier as the communication partner. Modeling should be carried out according to the DHACA® method skill, starting with word-phrases and phrases with two to three pictograms, in different situations, and exploring various communicative functions. Thus, the communication book is not restricted to children but is also used by all communication partners who are in their environment and wish to communicate with them[6].

The intervention process with the DHACA® method continually stimulates the child's use of functional communication when the communication partner validates the child's expression, demonstrating comprehension through AAC in different social contexts[9].

Although clinical practice currently uses robust communication systems and modeling as therapeutic AAC strategies for subjects with complex communication needs (CCN)[10], there is still a scarcity of national research using robust communication systems or studying the communicative development, with or without SLH intervention, of children with ASD. Furthermore, few studies examine communication in twins, especially dizygotic twins. Therefore, this study aimed to analyze the development of communication in dizygotic twins with autism using the DHACA® method.

CLINICAL CASE PRESENTATION

This is a longitudinal, qualitative, quantitative case study, linked to the research project approved by the Research Ethics Committee of the Federal University of Pernambuco – CEP/UFPE, under approval number 45050721.2.1001.5208, following the ethical and legal principles in force. The participants' parents/guardians signed an informed consent form and the necessary commitment and authorization form, given that the study was carried out in a teaching clinic affiliated with the Brazilian Unified Health System (SUS).

This study was conducted with a pair of dizygotic twins (GM and GF), 3 years old, diagnosed with autism (ICD 10 F84.0), based on the evaluation of a multidisciplinary team composed of a pediatric neurologist, a SLH pathologist, a psychologist, and an educational psychologist. During the diagnostic process, the twins underwent the auditory brainstem response (ABR)

test, obtaining a result within the normal range. The psychiatric evaluation using the Childhood Autism Rating Scale (CARS)[11] indicated that GF was minimally verbal (i.e., using 0 to 20/30 words in speech, restricted to certain contexts), and GM was nonverbal.

It is relevant to consider that delays in language and communication development may be associated with both biological conditions, such as prematurity and twin birth, and the specific characteristics of autism. This overlap can generate diagnostic challenges.

GF (female twin) and GM (male twin) were born prematurely at 34 weeks, GF weighing 1,950 kg and GM weighing 1 kg, in an emergency cesarean section due to the mother's high blood pressure. After birth, GF was discharged on the 5th day of life, and GM needed to stay in the incubator for 3 months due to a hospital infection.

At 2 years of age, in consultation with a pediatric neurologist, they were diagnosed with autism. From 2 years and 6 months onwards, they began receiving care from a psychologist and an educational psychologist and started attending a daycare center on alternate days of the week, beginning speech therapy at age 3.

The pediatric neurologist referred GF for SLH therapy due to her limited vocabulary. At 1 year and 11 months, she said "mommy" and lost this ability shortly after, returning to verbalization through songs and a few isolated words at 2 years and 10 months. She presented echolalia and grabbed adults by the hand and pulled them to try to ask for something. She did not demonstrate communicative initiative and preferred to play alone, presenting difficulties in situations that separated her from her parents (with panic attacks) and self-harming behaviors when tired or bored.

The pediatric neurologist also referred GM for SLH intervention due to the absence of speech, presenting only vocalizations. Initially, due to premature birth and the period of hospitalization after birth, the family did not suspect that the speech delay was significant, noticing the first indications of the delay only from 1 year and 11 months of age, considering that he did not present social initiatives and showed discomfort through crying and screaming.

SLH intervention lasted 9 months (April to December 2023) at the SLH Teaching Clinic of the Federal University of Pernambuco. Sociodemographic data were collected from the parents using the medical history protocol; then three individual sessions were held with the children for evaluation, applying the Communication Assessment in Autism Spectrum Disorder (ACOTEA)[12] and the CARS.

The ACOTEA assesses aspects of expressive communication, receptive communication, and social behavior. It consists of three sections, where questions 1-21 correspond to aspects of receptive communication, with an overall score of 0 to 62; questions 22-25 to expressive communication, with an overall score of 0 to 12; and questions 26-36, with a score of 0 to 33, to social behaviors related to language acquisition skills, such as eye contact, imitation, shared attention, and symbolic play. The score per question ranges from 0 to 3, where 0 = never, 1 = sometimes, 2 = frequently, and 3 = always, except for questions about tantrums (20), stereotypies (30), hypersensitivity (31), and hyperfocus (33), in which the scoring is reversed, with 0 = always, 1 = frequently, 2 = sometimes, and 3 = never. Higher scores indicate better performance in communication skills.

The assessment took place in three sessions, during which the therapist interacted with the child playfully, using toys suggested by the ACOTEA. The sessions were filmed for later analysis of the child's behaviors and completion of the protocol questions.

The CARS, used to identify and classify the aspects of the disorder, is composed of 15 domains, with scores ranging from 1 to 4. The overall score ranges from 15 to 60, and the classification of the level of autism is based on the following intervals: 15-30 = no autism, 30-36 = mild-moderate autism, and 36-60 = severe autism.

The SLH intervention process began after the assessment. The intervention had weekly sessions lasting 30 to 45 minutes, using the DHACA® method. After 20 sessions, they were reassessed in three sessions with playful activities to collect the ACOTEA data. Data were also collected from the progress report, completed at each session throughout the 8-month intervention.

The collected data were entered into a Microsoft Excel spreadsheet and analyzed using the Statistical Package for the Social Sciences (SPSS), version 22. Descriptive analyses were performed using their absolute and percentage frequency distributions, based on a comparison of the information obtained before and after the intervention with the DHACA® method.

DHACA® uses a communication book with 60 pictograms, selected based on core vocabulary, with words frequently used during interactions, such as verbs, adverbs, adjectives, and pronouns, and fringe vocabulary, with low-frequency words, mainly nouns, grouped into tabs divided by lexical categories, which are added gradually, according to the needs and interests of the AAC user[6].

DHACA® helps to develop the following skills: initial communicative intent, request with lexical expansion in fringe vocabulary, request with lexical and morphosyntactic expansion, morphosyntactic, lexical, and communicative function expansion, and finally, dialogue[6].

After 20 sessions, the twins achieved skill 3 – i.e., the construction of sentences with "I + want + two pictograms (which could be from core or fringe vocabulary)". GM needed fewer sessions to acquire this skill (Table 1).

CARS classified GM with severe autism before the intervention, with a score of 39, which changed to mild-moderate after the intervention, with a score of 30. GF was classified with mild-moderate autism, with a change in score from 35 to 30, respectively, maintaining her classification of mild-moderate autism. The comparison of the children's results before and after the intervention showed that GM responded better to the intervention.

According to ACOTEA results, GF and GM increased the score of all communicative skills; GF obtained the best pre- and post-intervention scores (Figure 1). In expressive communication skills, the twins had an equivalent increase of 24.19% post-intervention. GF obtained the highest score in receptive communication, with a percentage increase of 33.33%, while GM obtained 25%. Regarding social behavior, GM and GF varied by 33.33% and 30.30%, respectively, between the initial and final scores.

The skills related to making requests (5, 8, and 9), which were more frequent after the intervention, stood out among the results regarding aspects of expressive communication (Figure 2). The reassessment also identified that GF acquired the ability to get someone's attention (7), offer or share objects (11), make comments (17), use sentences with four or more words (18), respect turns, and maintain a conversation (19). GM acquired the skills of naming objects (16), not having tantrums (20), and

presenting a social smile (21). Moreover, the item on expressing interest in other people (4) was scored in the twins' reassessment, being another aspect acquired after the intervention.

Figure 3 shows the frequencies of use of receptive communication skills. The twins had a higher frequency in "responding to their name" (22) and "understanding and executing commands" (25) during the reassessment sessions.

Regarding social behavior (Figure 4), GM acquired skills in imitation (28), shared attention (27), expressing affection (28), eye contact (29), and initiative to perform activities (32), and reduced the frequency of stereotypies (30) and hypersensitivity (31). GF scored on all items and had acquired symbolic play (35), reducing the frequency of exploration of objects/toys (34). After the intervention, the twins began to engage in play with the pathologists (36).

DISCUSSION

Changes in communication development and difficulty with social interaction are key characteristics of ASD[1]. Furthermore, twinning reduces communicative interest, contributing to delays in language acquisition[2]. SLH therapy is entirely focused on communication development; one of the therapeutic approaches is the DHACA® method, which uses a robust communication system with core and fringe vocabulary to enable the development of different communicative functions and increase sentence structure[12].

The gradual introduction of fringe vocabulary can also promote lexical development[10]. In this study, GM acquired 21 pictograms after 20 sessions, varying between pronouns, verbs, and nouns, and GF acquired 33 pictograms, using a greater variety of core and fringe vocabulary encompassing pronouns, verbs, adverbs, articles, and nouns.

Applying a robust system contributes to the use of broad phrasal patterns and to the development of pragmatic, semantic, and morphosyntactic aspects[10]. Regarding morphosyntactic development, GF began to make requests with phrases with up to five pictograms, such as "I want to open the cupboard," "I want to catch more cows," with verbalization. GM made requests with phrases such as "I want animals," "I want chocolate," without verbalization.

Regarding the development of morphosyntax, a case series of 12 nonverbal and minimally verbal children with ASD aged 2 to 5 years found communicative skills achieved with morphosyntactic structures of three to seven words, with diverse pragmatic functions, after 20 intervention sessions using the DHACA® method. These findings confirm the results of the present study, which pointed to the effects of the intervention with the implementation of the DHACA® method, contributing to morphosyntactic development. This was evidenced by the increase in the length and complexity of sentences and the development of pragmatic functions and expansion of vocabulary, increasing communicative functioning[13].

Table 1. Number of sessions for each child to acquire communicative skills using the Development of Communication Skills in Autism

	GF	GM
Initial communicative intent	6	6
Request with expanded fringe vocabulary	10	10
Request with lexical and morphosyntactic expansion	16	11

Subtitle: GF = female twin; GM = male twin

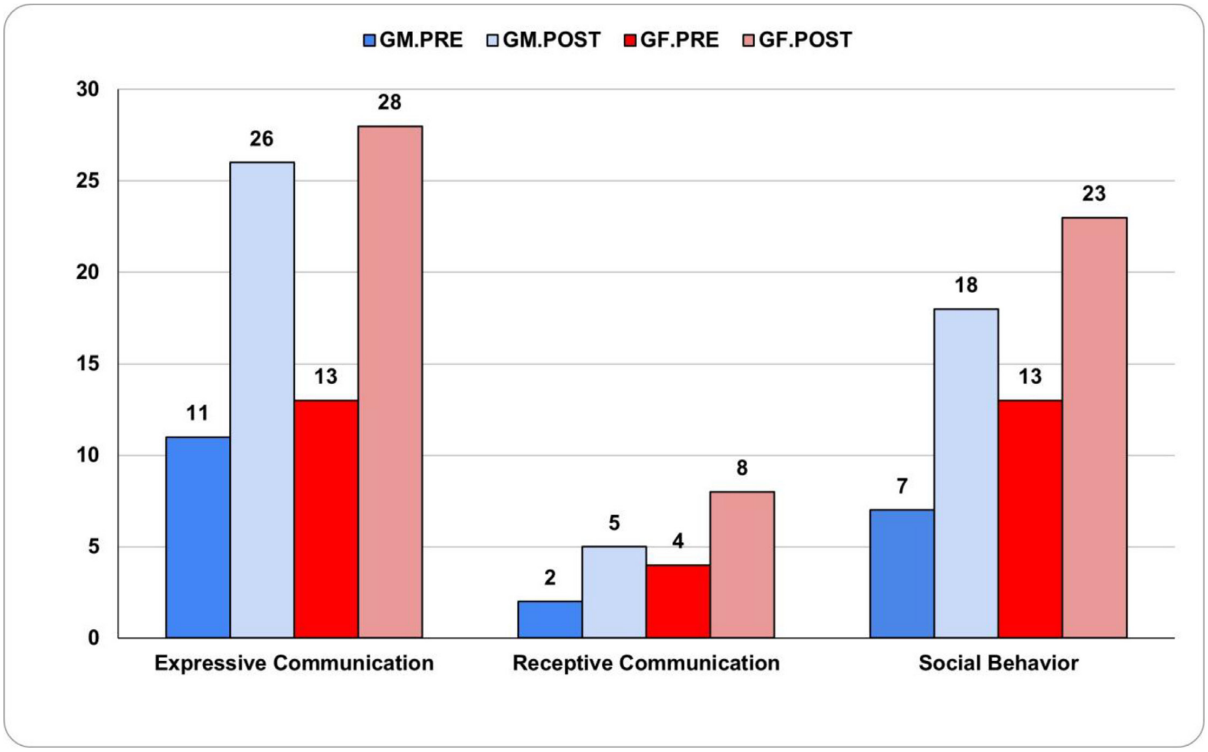

Figure 1. Results of the Communication Assessment in Autism Spectrum Disorder before and after the intervention
Subtitle: GM.PRE = Male twin pre-intervention; GM.POST = Male twin post-intervention; GF.PRE = Female twin pre-intervention; GF.POST = Female twin post-intervention.

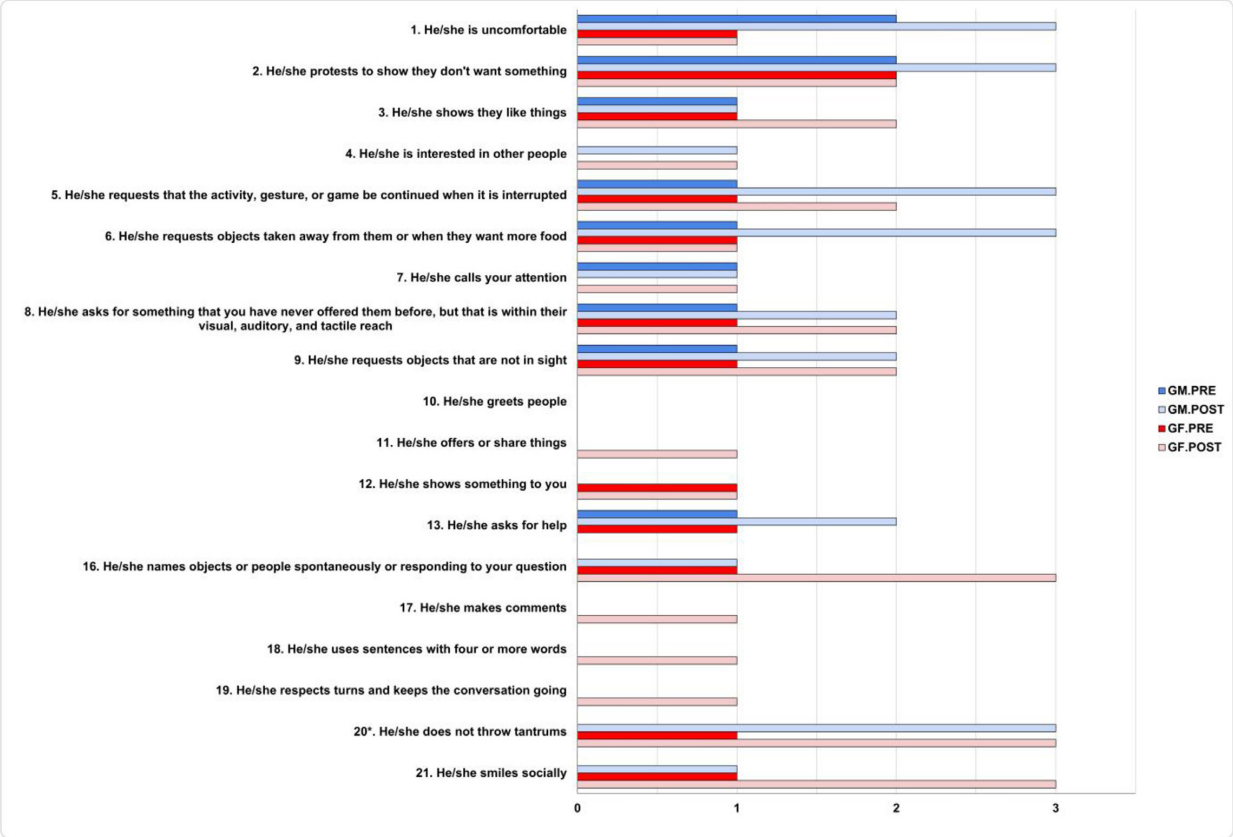

Figure 2. Description of the results of the expressive communication section of the Communication Assessment in Autism Spectrum Disorder, pre- and post-intervention
Subtitle: GM.PRE = Male twin pre-intervention; GM.POST = Male twin post-intervention; GF.PRE = Female twin pre-intervention; GF.POST = Female twin post-intervention. 0 = Never; 1 = Sometimes; 2 = Frequently; 3 = Always

The results demonstrated that SLH intervention using the DHACA® method also favored the differentiated development of expressive and receptive communication and social behaviors in each twin.

In expressive communication, the scored items (making requests, naming objects or people, expressing interest, calling someone's attention, smiling socially, and not having tantrums) indicated that the twins frequently demonstrated communicative intent. These data reinforce findings from other studies in which AAC use favored the development of pragmatic aspects and social interactions, which were affected in children with autism[14].

Confirming the results of the present study, another intervention investigation with the DHACA® method with 12 nonverbal or minimally verbal children with ASD showed the advancement of expressive communication skills, with an increase in communicative intent, reinforcing the relevance of intervention studies with AAC[15].

An important indicator of communicative intent in twins is the increase in the frequency of requests and the ability to respond to their name. Being able to request an object that has been taken away, continuing an activity, requesting something that is in their field of vision, and especially requesting objects that are not in their sight are important actions for effective communication.

The results of this study indicated a reduction in unwanted behaviors, which may be related to the ability to request something, even if it is not in their field of vision, considering that the item "having tantrums" was not observed in any of the three reassessment sessions. Furthermore, the children began to indicate more frequently what they wanted. These data agree with those of a study that evaluated the effects of using alternative communication in the family context with a nonverbal child with ASD (or with non-functional speech), indicating that being able to request desired items reduces disruptive behaviors, making the child calmer and more participative[16].

Although authors argue that there is no difference in speech or vocabulary development in twins of different sexes[17], this study showed that GF, who is female, acquired skills related to functional speech development, such as "making comments" and "sentences with four or more words," respecting turns, and maintaining a dialogue. These results demonstrate that GF had greater development than GM, since he did not acquire oral language after the intervention, unlike GF, who spoke orally in most communicative situations. However, both had equivalent percentages in ACOTEA regarding the various expressive communication aspects.

Dizygotic twins share genetic similarities (although they are not identical) and share similar environmental aspects, such as their upbringing with their parents at home. However, there are other environmental influences that impact each one differently and that possibly define developmental singularities. The fact that GM was hospitalized for 3 months in an incubator and with a hospital-acquired infection may have been one of the factors indicating that the environment influences each person's development differently.

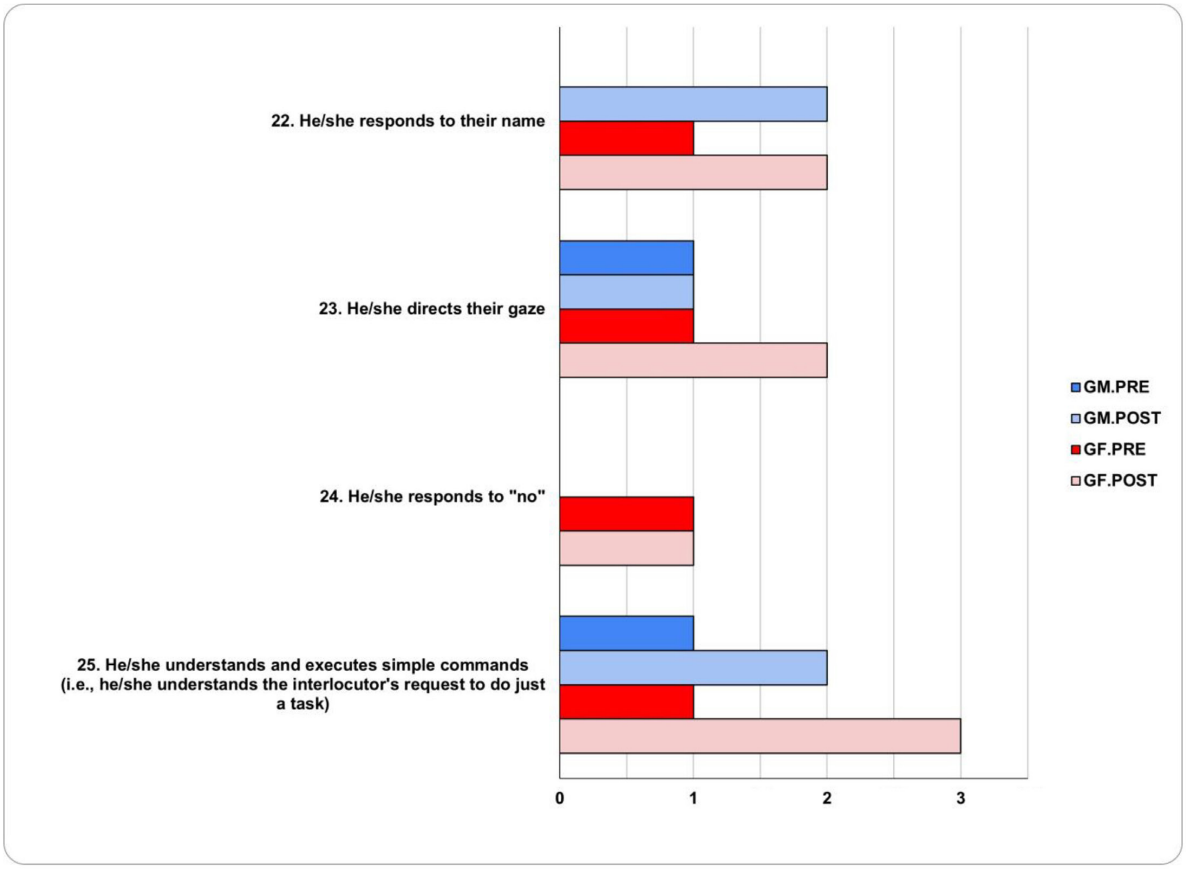

Figure 3. Description of the results of the receptive communication section of the Communication Assessment in Autism Spectrum Disorder, pre- and post-intervention

Subtitle: GM.PRE = Male twin pre-intervention; GM.POST = Male twin post-intervention; GF.PRE = Female twin pre-intervention; GF.POST = Female twin post-intervention. 0 = Never; 1 = Sometimes; 2 = Frequently; 3 = Always

This environmental issue may also justify the greater delay in GM's development. However, it is crucial to highlight GM's progress in communication skills after intervention with AAC using the DHACA® method.

Receptive communication is one of the many aspects improved with the use of the robust communication system[10]. The ACOTEA reassessment showed that the twins began to respond when called, to direct their gaze, and to understand and carry out simple commands, becoming more responsive to social interactions.

Modeling was a strategy used during the intervention with the DHACA® method. According to studies, the use of AAC associated with modeling can favor pragmatic, semantic, syntactic, and morphological development[18]. The children began to understand and execute commands and expand their vocabulary and grammatical construction as they received a model from their communication partner. Hence, the use of modeling contributed to the development of receptive and expressive communication.

Regarding social behavior, the skills of imitation, shared attention, eye contact, expressing affection, and intention to initiate some activity became more frequent in GF and were acquired by GM after the intervention. These skills, especially imitation, are predictors of social relationships, communication, learning, and linguistic-cognitive abilities. Furthermore, they can be responsible for variation in the production of expressive and receptive vocabulary[19].

Another important skill for learning is play. It evolves with age, starting with primitive play, in which the child explores toys and objects in a sensory way, followed by functional play and symbolic play. A study analyzed primitive play in babies and indicated that children with ASD have difficulty making the transition from primitive/sensory play to symbolic play[20]. In the present study, the ACOTEA reassessment showed that GM explored toys and objects more often, while GF presented functional play and symbolic play, thus reducing the frequency of sensory exploration of toys and objects. Moreover, the twins acquired "engaged play with others" after intervention with the robust communication system.

In addition to difficulties with social interaction and communication, other determining aspects for the diagnosis of ASD are restricted and repetitive interests, whether in speech, body movements, or handling objects[1]. After the intervention, the twins reduced the frequency of stereotypies, fixation/persistence on an object, or hypersensitivity, showing that the use of the alternative communication system favors the development of both communicative skills and behavioral aspects[10].

The study identified advances in the development of the twins' communicative skills, interaction, and social behavior. Although GF obtained the same score after intervention on the CARS scale, she remained in the mild-moderate classification, while GM evolved from the severe to the mild-moderate classification.

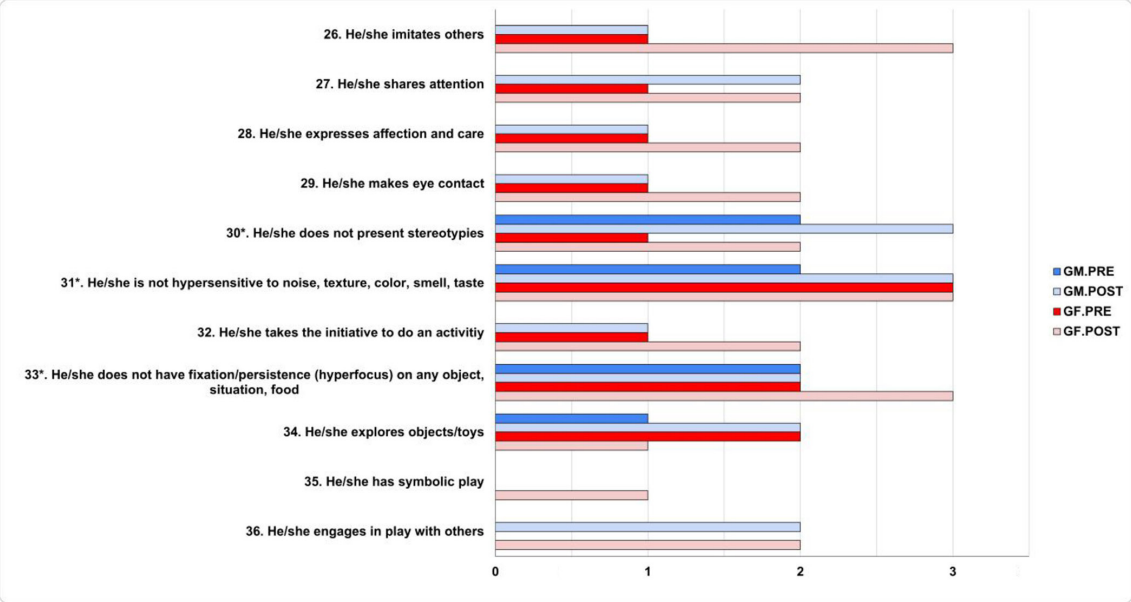

Figure 4. Description of the results of the social behavior section of the Communication Assessment in Autism Spectrum Disorder, pre- and post-intervention
Subtitle: GM.PRE = Male twin pre-intervention; GM.POST = Male twin post-intervention; GF.PRE = Female twin pre-intervention; GF.POST = Female twin post-intervention. 0 = Never; 1 = Sometimes; 2 = Frequently; 3 = Always

The analysis of ACOTEA results shows that GM acquired nine skills that were present in GF before the intervention. Besides the acquisition of new skills, the applicability of the method increased the frequency of skills already developed before using AAC. Thus, GF's final score was higher than GM's, considering that the items previously observed were more frequent or always frequent after using the DHACA® method.

FINAL COMMENTS

SLH intervention using the DHACA® method favored the development of expressive, receptive, and behavioral communication skills in twins, as evidenced by the advancement in skills and variation in CARS and ACOTEA scores.

Given the low probability of autism occurring in dizygotic twins, one of the study's limitations was the small sample size. Moreover, the scarcity of studies involving the use of AAC in twins made it difficult to compare results with other research on similar samples. Despite these limitations, this study showed that the use of the DHACA® method favored the development of communicative skills and social interaction, improved behavior by reducing tantrums and other disruptive behaviors, contributed to the expansion of vocabulary and grammatical construction, developed play, and increased communicative intent in twins with autism.

The sample size may have implied a limited representation of the results, restricting the generalization of the findings to other populations. Furthermore, other factors may have influenced the results, such as the twins' participation in other therapies and family engagement. Therefore, further studies with other samples with a similar profile are recommended for a more comprehensive and conclusive understanding of the impacts of the DHACA® method on the social communication and interaction of twin children diagnosed with ASD.

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